

**ABSTRACT OF THE DISCLOSURE**

A pulsed solid-state thin-disk laser comprises an optical resonator and a solid-state laser gain medium placed inside the optical resonator. The laser gain medium is in the shape of a thin plate or layer with two end faces, the extension of the end faces being greater than a thickness of said plate or layer measured in a direction perpendicular to one of the end faces. One of the end faces comprises a cooling surface, via which the laser gain medium is cooled. A pumping source is provided for exciting the laser gain medium to emit electromagnetic radiation. The thin-disk laser further comprises means for passive mode locking placed inside the optical resonator. The mode-locking means are preferably a semiconductor saturable absorber mirror (SESAM). The laser offers a high average power, a good beam quality, short pulses and a high efficiency. Problems such as thermal lensing, Q-switching instabilities and damages of the mode-locking means are avoided. Moreover, the output power of the laser is scalable, i.e., may be increased without increasing the above-mentioned problems.